

74
381

FOREST INSECT SURVEYS - MODOC NATIONAL FOREST

SEASON OF 1934

Including the 13th Report of the Annual Survey of the
Hally Camp- Lava Beds area.

Introduction

The 1934 survey of forest insect infestations in the Modoc National Forest was conducted as an IMPNIRA project in which the United States Forest Service and the United States Bureau of Entomology and Plant Quarantine co-operated. A four man field crew worked from October 1 to October 20 in securing the basis for estimates and control recommendations.

Approximate costs of the work were as follows:

Item	Cost	Man Days
Field Labor	\$ 422.96	78
Office Labor	100.34	14
Transportation and Misc.	9.75	
=====		
Totals	\$ 533.05	92

Basis for the Estimates

Fifteen half section plots and two 480 acre traverses were cruised during the field work. 1933 loss records were completed and the partial 1934 losses were marked. The use of a four man crew enabled a closer cruise than is ordinarily possible. The sample totalled 5760 acres or about 1.8% of the entire area. The actual cruise work involved the mapping of the entire acreage from 72 miles of compass line, the examination of every suspicious tree on the entire acreage, the marking of over 4 million board feet of infested timber and the recording of essential data for about 4500 trees.

In the office the application of a correction factor as an allowance for infestation of the current year that is missed because of lack of any outward indication, or that has not occurred at the time the cruise was made, is an item of considerable importance. On the basis of computations made by Keen in 1931, the 1933 cruise figures, which were secured during the period of from Aug. 30 to October 13, were corrected by factors ranging from .55 to .92. Completion of the 1933 loss record by the 1934 cruise showed the factors to be used should have ranged from .24 to .71. This error probably was due to the rapidly increasing character of the infestation and the relatively long period of activity following the cruise dates.

According to Keen's figures correction factors of from .80 to .96 should be used this season. However, due to the rapidly increasing character of the 1934 infestation, and the fact that the activity of the third generation of beetles is great, an arbitrary reduction of .20 has been made in the normal factor and figures ranging from .60 to .75 have been used in estimating the 1934 losses.

General Infestation Conditions

In 1933 the season opened with a light western pine beetle population, due to the effects of the low temperatures of December, 1932, and February, 1933. Activity in the 1933 season did not start until about the first of June and at that time the western pine beetle survivors were decidedly a minor factor in the infestation, other species having survived the winter much more successfully. During the active season of 1933, the western pine beetle became more important, in part due to the production of a full second generation and a partial third, and in part due to the fact that the developing brood was not hampered by excessive competition. They infested a much greater bark surface as a result of the greater than normal spreading of the egg galleries under the bark. In spite of this, however, analysis of infestation on the Badger Control Project area of 1933 showed that the western pine beetle, in either pure or mixed infestation, was involved in but about 70% of the total infested bark surface. Mountain pine beetle and flathead brood, either pure or in mixed infestations, was involved in about the same proportion of the total infested bark surface.

During the winter of 1933-34, mild temperatures prevailed so that, during the normally inactive period immature stages continued growth and the early spring found the greater portion of the population in the large larval stage or nearly ready to emerge en masse. About the middle of April activity started for the 1934 season. Before the end of the season, practically a complete third generation had been produced, infestation was much greater than during the 1933 season and losses were predominantly caused by attacks of the western pine beetle. The composition of infestation in terms of the percent of volume infested by the various important insect species are as follows, for the 1933 and 1934 seasons:

	1933	1934
D. brevicornis	56.1%	91.1%
Melanophila species	11.6	1.7
D. monticolae	9.5	3.0
Mixed infestation	21.1	4.1

The increase in importance of the western pine beetle is well illustrated by the above figures.

Losses resulting from infestation by all types of insects increased by more than half as much as the total loss of 1933, and the average loss is estimated to amount to about 340 b.m. per acre. In general the average volume of infested trees decreased somewhat during 1934, although some plot results showed the 1934 infested trees were larger than those killed in 1933.

Infestation conditions in the various units

Table I is a summary of plot cruise results giving the figures for 1932, 1933 and the estimated losses for 1934. Table II shows the estimates for the entomological units of the area in terms of trees and volume per section and per unit. Figure V shows the loss record for each unit since 1921, and figure VI shows the location of areas and plots. Figure VII gives a similar information for the Buck Creek Unit in the Warner Mountains.

Glass Mountain Unit.- As shown in figure VI, much of this area is now cutover. That portion along the fringe, the virgin timber of which is sampled by plot RS 4, has suffered such heavy losses during the last 13 years that the dead snags that are left by logging must more than equal the volume of timber it is possible to cut. The present day desolate conditions on the cutover area are illustrated by figure I in which possibly 5000 b.m. per acre remains on the area as impossible of utilization. The plot sampling this timber type still suffers such heavy losses that it is impossible to conceive their continuance for any considerable period in the future without the complete destruction of the commercial timber. This plot and the fringe it samples is a typical example of the insect losses occurring in the northern fringe of timber in the Modoc National Forest. In this fringe unmistakable and marked recession of the timber margin is in progress.

Cutover lands in the better type timber, which in many cases is within a few miles of the fringe type, is making a satisfactory annual increment gain. Losses in the virgin stands are greater than the annual increment, although no heavier than in many other areas in the Modoc Plateau. The trend of infestation in this better type timber during the past three years, and in spite of the reduction of population by low temperatures in 1932, has been definitely upward. One feature of the infestation in the better quality timber of the southern portion of this unit has been a definite and noticeable extension of losses into previously relatively lightly infested stands.

Timber Mountain Unit.- No figures of insect caused losses have been given for this unit as fires, logging and the natural recession of timber type have so depleted the greater portion of the 1600 timbered acres that important values no longer remain. Recently completed studies on two plots in this unit showed a net annual loss of over 6% of the stand. Even the reproduction, which occurs in dense thickets, is being infested and is shown by a comparison of figure II, taken in 1931, with figure III taken in 1934.

Badger Unit.- This unit, parts of which were controlled in 1928, 1929, 1931, 1932 and 1933 shows losses that continue to be much greater than the increment which, on one plot, has been determined to be but 38 b.m. per acre per year. It is apparent, in view of the increases on plots controlled in 1933 that, under the environmental conditions that have and still are affecting the area, control has little or no effect on the infestation.

Unusually heavy centers of infestation exist in the areas near Flag Spring, Rail Mountain and east of Brown's Well. In addition, the timber west and south of Joaquina Reservoir (Hackamore) has suffered tremendous losses that, on plot #3, amounted to over 1,000 b.m. per acre this season alone.

Happy Camp Unit.- This area of better quality timber, which is largely privately owned, is, in spite of its quality, suffering from an extremely heavy, active and general infestation. This season, there has been noted a tendency towards the formation of groups of infested trees as illustrated by figure IV. The loss records of Plots RS2, RS3 and #8, which we believe illustrate conditions in at least the northern two thirds of the unit, are evidence of the serious nature of present infestation conditions.

Lava Beds Unit.- In this unit, contrary to general tendencies in the Modoc area, the 1933 losses showed an appreciable increase and the 1934 losses show another slight to appreciable increase. As the timber in the south half of this unit is relatively fast growing and vigorous, the infiltration of infestation and increase of losses to over 200 b.m. per acre is serious and apparently indication of the effects of marked changes in basic environmental factors influencing the area.

In the northern and eastern portion of the unit, the timber is more mature, much slower growing and climatic conditions are more extreme. Infestation in this portion of the unit is extremely heavy and is one with the epidemic center of the western Badger and northern Happy Camp units.

Pit River Unit.- The presence of better environmental conditions affecting the block of timber on the north side of Happy Camp Lookout and the fact that much of the remaining timber in the unit is in the form of a mature, open type stand or in stringers surrounding flats, has prompted us to consider the average for the unit lower than the losses cruised on the p lot. As elsewhere, the infestation has risen markedly during the past season, although apparently not as much in the extreme fringe type as in the more typical stands representative of the Modoc timber.

White Horse Unit.- This area, now in the process of being cut, has had no sample taken this season. It is expected that, when disturbances from logging operations are discontinued, the record will be continued as a study of losses on cutover areas.

North Warner Areas - Buck Creek Unit.- The cruise of RS 11, which samples the heavier infestation in this unit, showed a slight increase in 1934 with a loss of over 150 b.m. per acre. This area, controlled in the spring of 1933, showed results during 1933 but it appears that the infestation now is reforming. The stand in the greater portion of this area is growing under more satisfactory environmental conditions than those on the Modoc Plateau. For this reason results of control are more likely to be satisfactory and, if the Forest Service considers the values in the area are worth the expenditure and that the date of utilization is definite enough to warrant the protection costs, control in this area would be advisable. It is estimated that from 200 to 225 trees and about 225 to 250 m.b.m. would need treatment. The probable cost would be in the vicinity of \$1100.

Consideration of Insect Control

Happy Camp- Lava Beds area.- During the period of 1921 to 1934, inclusive, it has been estimated that, on the average, the loss has been in the vicinity of 2% per year, and has totalled 1,083 million board feet during the fourteen year period. Some areas have suffered less, others have suffered much more and an average loss in the worst areas of 7% applies to a fairly large acreage. Recent conversation with Mr. Kenneth Walker, of the Red River Lumber Company, indicates that these estimates come very close to the actual condition as shown by the final results, i.e.- the logging operation.

The large ownerships in the area are the Red River Lumber Company, whose chief interests lie in the Happy Camp Unit, the Long Bell Lumber Company interested in the better type timber of the Glass Mountain Unit, and the Picker-

ing Lumber Company with interests lying in the Glass Mountain, Happy Camp and Badger Units. Pickering and Long Bell have salvaged the greater portion of their values in the Glass Mountain Unit, but private interests have salvaged but a small portion of the values in other units. The government has large unsalvaged values in the Badger and Lava Beds Units.

Control projects that have been carried on in the Happy Camp- Lava Beds area have largely been those of the Government in the Badger and Lava Beds Units. In the Badger projects the Pickering Lumber company has cooperated in order to protect a sale contract. In the Lava Beds the McCloud River Lumber Company cooperated as the project was primarily to protect their holdings.

Against rapidly rising infestations, two of the six projects showed definitely beneficial results and returned a profit. Against normally decreasing infestations, two projects have been partially successful and showed a loss; and against increasing infestations two others have been partially successful or unsuccessful and in both cases showed a loss. In all cases, even where successful results were secured, within two years infestations returned to an abnormal level. Even during years, such as 1930, when infestation conditions were considered normal endemic, losses were, with the possible exception of the better timber type areas, greater than the annual increment gains. Under such conditions, which have existed for at least the past ten years, there is no conclusion that can be drawn except that the stands are decadent, the pressure of environmental factors is forcing an increasing reduction in vigor, and that present methods of control, under such conditions, and with expectation of returns on the expenditures, are not productive of results. This conclusion, with a 340 b.m. loss per acre, estimated for the current year, an exceptionally heavy loss caused by the western pine beetle, and every evidence of an increasing infestation is a difficult one for control-minded entomologists and foresters to accept. However, acquaintance with the conditions of the area, the recession of the timber type, the moisture deficiencies, the growth patterns of trees and more especially the fact that the values to be protected are, in many areas not more than half those of ten years ago, and in some areas are less than a fifth, can lead to no other conclusion.

If salvage were a guaranteed certainty within three years, or if it were certain that the more favorable climatic cycle predicted by many for the period of 1936 to 1940 would occur and would be of sufficient intensity to result in a marked recuperation of the living trees now on the area, benefits from control at the present time might liquidate the charges. In view of the uncertainty of logging or recuperation, facing the facts of a decadent stand being rapidly depleted, and in spite of the abnormally heavy loss and epidemic infestations, no control is recommended. It is recommended, however, that no effort be spared to salvage those values that remain, an operation that, over a large part of the area must take the form of a nearly complete salvage.

North Warner Areas-Buck Creek Unit.- In 1932 control of the Badger Area in the Happy Camp- Lava Beds unit proved unsuccessful. That in the Buck Creek Unit proved successful, a reduction of 71% being secured. The reason probably lies in the differences in environmental factors.

The 1933 infestation, although relatively low in comparison with losses of the previous year nevertheless remained fairly high. An increase of

14% is forecast for the present season. There is every indication that the area is beginning to suffer from the effects of the general increase in intensity of environmental factors, but it also appears that, with logging operations within five years a possibility, and a somewhat lower intensity of environmental pressure, control of infestation and return of expenditures through logging is feasible. Accordingly it is recommended that the control of this small, isolated area be attempted this season. Tentative figures concerning the project have been given under the discussion of infestations. Either fall or spring control is possible, but with satisfactory climatic conditions still obtaining, it would appear advisable to attempt the completion of the project before the season is closed.

Summary

1. The rapid late season increase of western pine beetle abundance in 1933 was followed by development during the winter of 1933-34 and continued increases in 1934.
2. Estimated 1934 losses reach the total of 105,680 M.B.M. on the 311,160 acres in the Happy Camp- Lava Beds area or an average of 340 b.m. per acre.
3. Western pine beetle brood caused but 56.1% of the total loss in 1933 but in 1934 caused 91.1% of the total. This indicates a considerable increase in the activity of that primary species.
4. Centers of heavy infestation exist as follows: Extreme eastern and western portions of Badger Unit; northern two thirds of the Happy Camp Unit; northern portion of Lava Beds Unit and continued heavy losses in the uncut eastern and northern fringe of the Glass Mountain Unit.
5. The Buck Creek Unit, in the North Warner Mountains, showed a slight increase over 1933 following a 71% reduction, probably due to the control of the 1932 brood.
6. Although much greater than increment losses are being suffered this year in practically all portions of the Happy Camp- Lava Beds area, no control is recommended.
7. It is recommended that no effort be spared to salvage those values remaining in the timber stands of the Happy Camp- Lava Beds area in lieu of further expenditures for insect control.
8. Control is recommended for the Buck Creek Unit because of its better chance of success, with the recommendation that utilization be not too long delayed.

TABLE I
PLOT LOSSES- MODOC NATIONAL FOREST
PER SECTION BASIS

	1932				1933				1934 (Estimated)			
Plot :	Volume	B.M.per			Volume	B.M.Per	Rel.to		Volume	B.M.Per	Rel. to	
No :	Trees:	B.M.	: Acre		Trees:	B. M.	: Acre	: 1932 %	Trees:	B.M.	: Acre	: 1933 Per Cent
RS 1:	314:	232,970:	364 :		178:	140,660:	220 :	-40 :	375:	302,100:	472 :	+115
RS 2:	310:	311,690:	487 :		128:	123,820:	193 :	-60 :	285:	262,100:	410 :	+ 59
RS 3:	178:	177,160:	277 :		82:	81,120:	127 :	-54 :	186:	202,800:	317 :	+150
RS 4:	624:	287,560:	449 :		608:	346,240:	541 :	+20 :	590:	308,300:	482 :	-11
RS 5:	142:	104,350:	163 :		86:	81,120:	(b)127 :	-32 :	271:	218,300:	341 :	+169
RS 6:	82:	71,160:	111 :		92:	119,200:	186:	+68 :	163:	128,400:	201 :	+ 8
RS 11:	284:	290,870:	(a)454:		100:	85,100:	133 :	-71 :	91:	97,100:	152 :	+ 14
# 1 :	236:	151,120:	236 :		122:	81,400:	127 :	-46 :	157:	104,400:	163 :	+ 28
# 2 :	242:	207,640:	324 :		142:	113,020:	177 :	-46 :	394:	298,900:	467 :	+164
# 3 :	232:	193,460:	302 :	(1933 Control Cruise missing)					603:	664,200:	1038 :	?
# 4 :	338:	231,440:	362 :		238:	194,920:	(b)305 :	-16 :	314:	307,600:	480 :	+ 58
# 5 :	88:	99,840:	156 :		54:	43,040:	(b) 67 :	-57 :	68:	56,400:	88 :	+ 31
# 6 :	178:	165,160:	(a)258 :		90:	96,200:	150 :	-42 :	188:	172,500:	270 :	+ 79
# 7 :	264:	222,260:	(a)347 :		110:	96,860:	151 :	-56 :	194:	147,600:	230 :	+ 52
# 8 :	266:	242,260:	379 :		186:	171,060:	267 :	-29 :	341:	233,700:	365 :	+ 37
Ave.(c)	253:	199,680:	312 :		158:	126,700:	198 :	-33 :	258:	202,870:	317 :	+ 68

- (a) 1932 Control
(b) 1933 "
(c) Plot #3 excluded from averages

TABLE II
ESTIMATED PER SECTION AND UNIT LOSSES
MODOC NATIONAL FOREST

UNIT	Timbered:				1933 Losses				1934 Losses			
	1932		Losses		1933		Losses		1934		Losses	
	: Acres. :	Per Section :	Per Unit	:	Per Section :	Per Unit	:	Per Section :	Per Unit	:	Per Section :	Per Unit
	(1)	Trees:Vol.BM.:	Trees:Vol.N.B.M.:	:	Trees:Vol. BM.:	Trees:Vol.M.B.M.:	:	Trees:Vol.BM.:	Trees:Vol.M.B.M.:	:	Trees:Vol.BM.:	Trees:Vol.M.B.M.:
Glass Mtn.	: 53,180 :	258:135,850:	23860: 12,570	:	264:194,880 :	21800: 16,170	:	305:188,370:	24990: 15,640	:		
Badger	: 88,070 :	225:193,000:	30980: 26,560	:	128:109,400 :	17600: 15,060	:	258:214,770:	35230: 29,500	:		
Happy Camp	: 66,370 :	251:243,700:	26930: 25,270	:	132:125,330 :	13300: 13,000	:	271:232,870:	27880: 24,160	:		
Lava Beds	: 71,670 :	176:161,870:	19690: 18,110	:	195:195,380:	21820: 21,860	:	303:295,800:	33900: 33,100	:		
Pit River	: 31,870 :	153:113,340:	7620: 5,640	:	81: 54,270::	4030: 2,700	:	105: 69,600:	5220: 3,460	:		
Totals	:311,160 :		108160: 88,150	:		78550: 68,790	:		127220: 105,860	:		

(1) Figures as of 1933



FIGURE I

Present day conditions on cutover lands in the Glass Mountain Unit. Probably over 5,000 b.m. per acre remains as impossible of salvage. The yield in green timber on 12,000 acres that have been cut within the last three years has been less than 5,000 b.m. per acre. Photo No. 8594. J.M. Miller, 1934.



FIGURE II.

West slope of Timber Mountain in 1931

Photo #7442- K.A.Salman



FIGURE III.

West slope of Timber Mountain in 1934

Photo #8433- K.A.Salman

Although no fires have occurred in this area during the period intervening between 1931 and 1934, note the differences in abundance of snags on the skyline, the death of mature trees on the slope and the death of reproduction at the base of the slope. These changes are but a single instance of the many examples of recession of timber type that are to be seen along the northern margin of timber type in the Happy Camp- Lava Beds area of the Modoc National Forest.

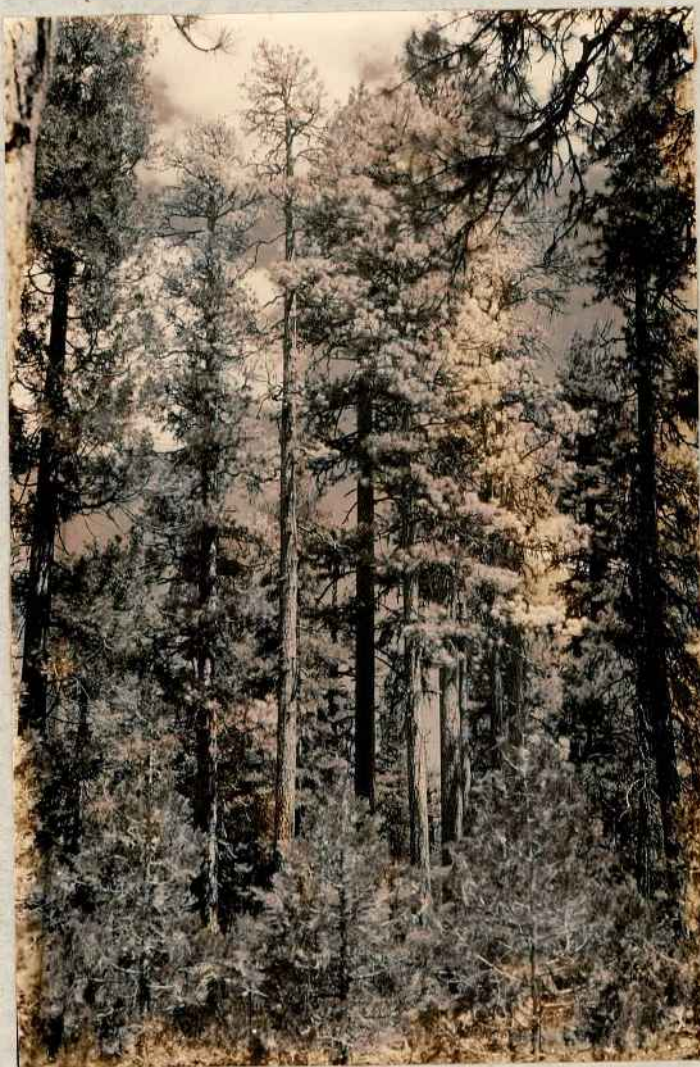


FIGURE IV

This season groups of infested trees are more common in the better type timber areas of the Happy Camp- Lava Beds area than in several previous years. This picture illustrates a typical 1934 summer group attack, the light colored trees pictured therein all containing brood. Photo #7596- K.A.Salman, 1934.

TABLE OF CONTENTS

INTRODUCTION	1
BASIS FOR ESTIMATES	1
GENERAL INFESTATION CONDITIONS	2
INFESTATION CONDITIONS IN THE VARIOUS UNITS	2
Glass Mountain Unit	3
Timber Mountain Unit	3
Badger Unit	3
Happy Camp Unit	3
Lava Beds Unit	4
Pit River Unit	4
White Horse Unit	4
North Warner Areas- Buck Creek Unit	4
CONSIDERATION OF INSECT CONTROL	4
Happy Camp - Lava Beds area	4
North Warner Areas- Buck Creek Unit	5
SUMMARY	6

TABLES I and II

Figures 1,2,3,4,5 (graph), 6 (Map Happy Camp), and 7 (Map Buck Creek

CC sent
RO 1
Forester 1
Modoc 1
RR Lumbr 1
Pickering 1
Long-Bell
(Weed) 1
FCC
FPK
JCE
KAS
RLF
FILES
2 X

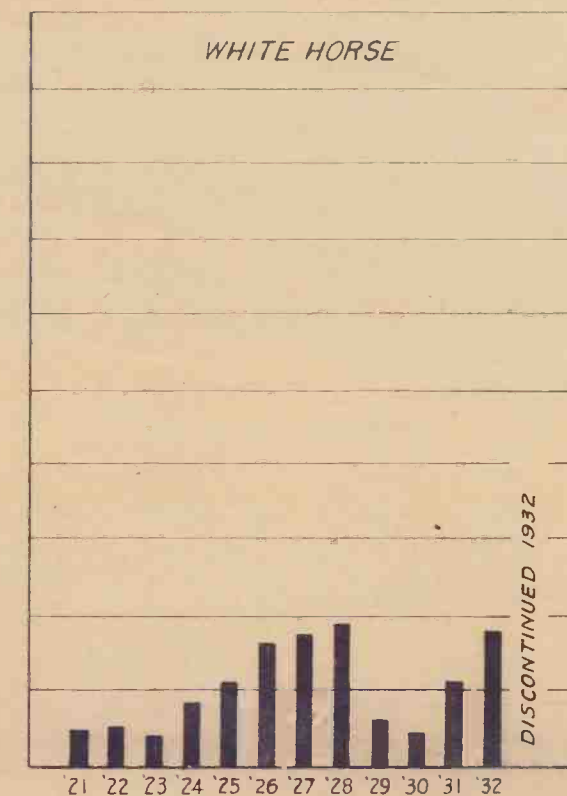
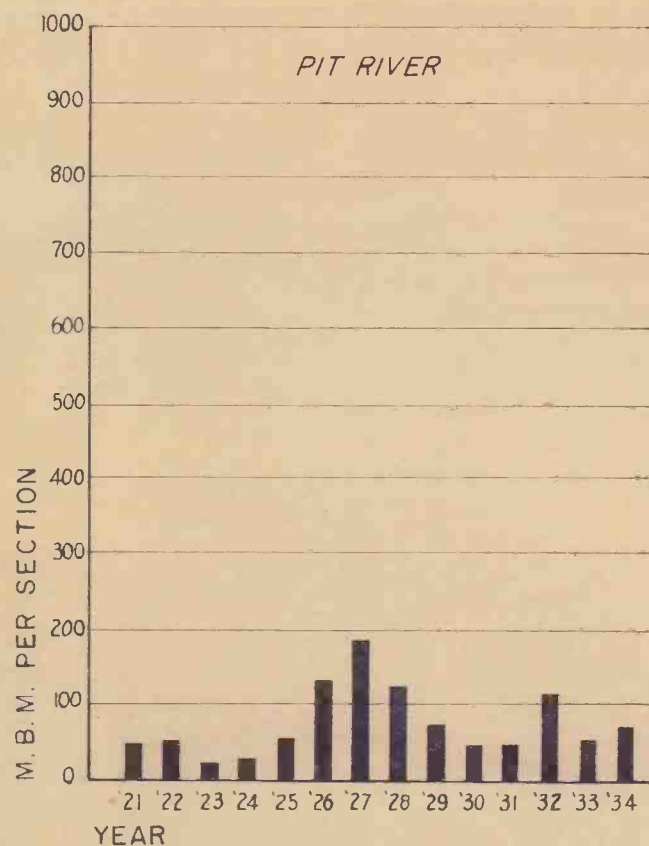
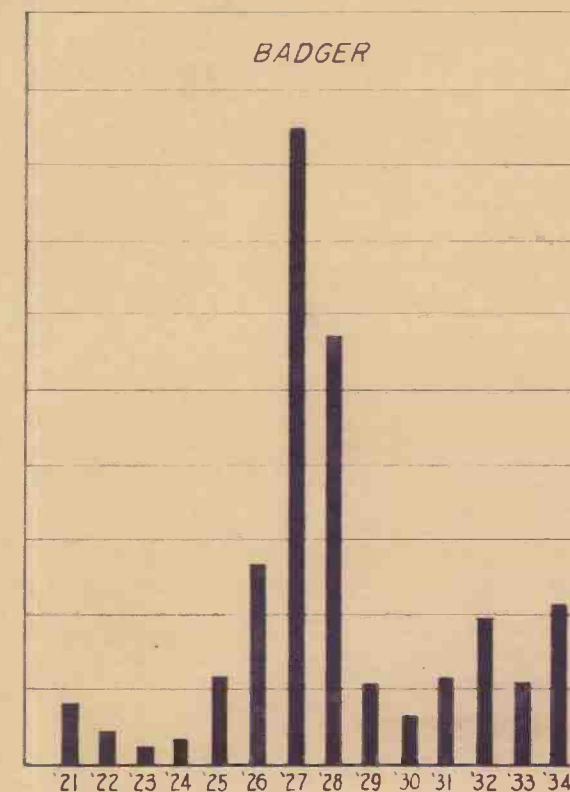
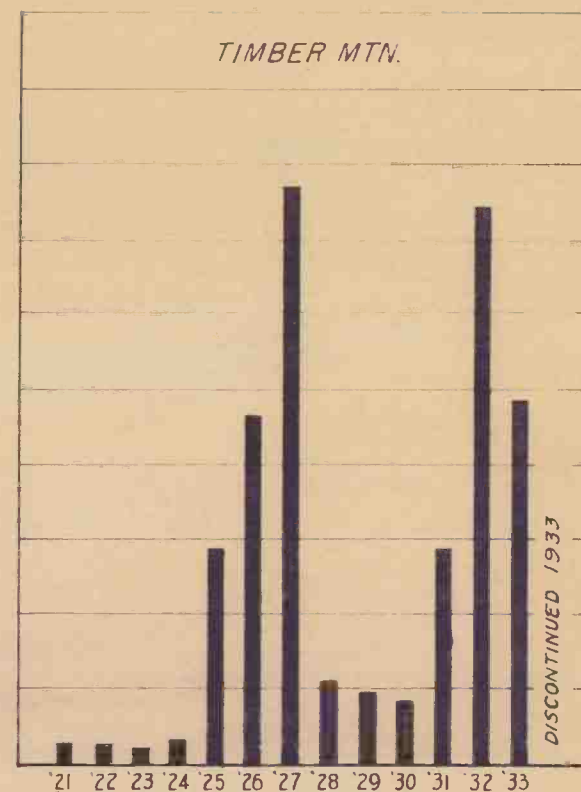
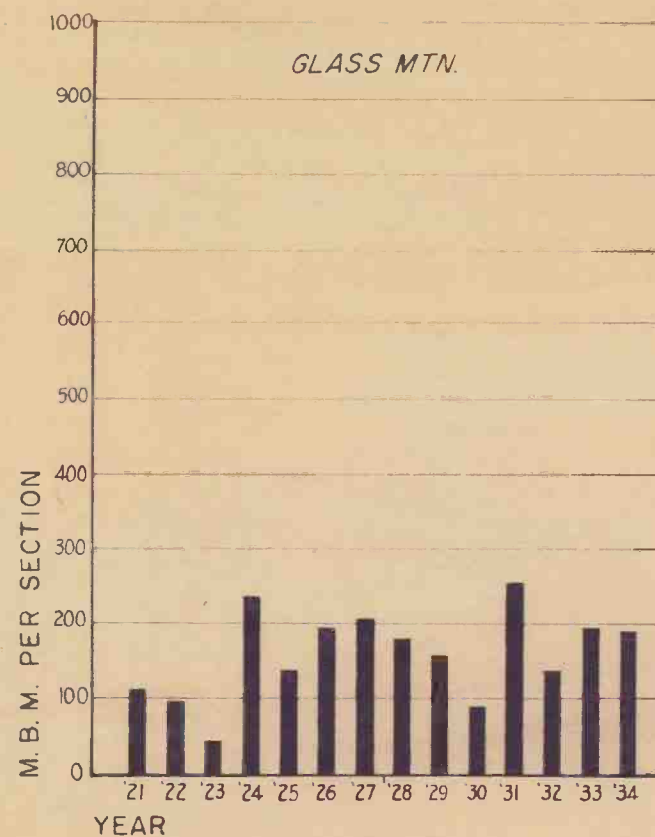
85

392

INSECT LOSSES
1921 - 1934

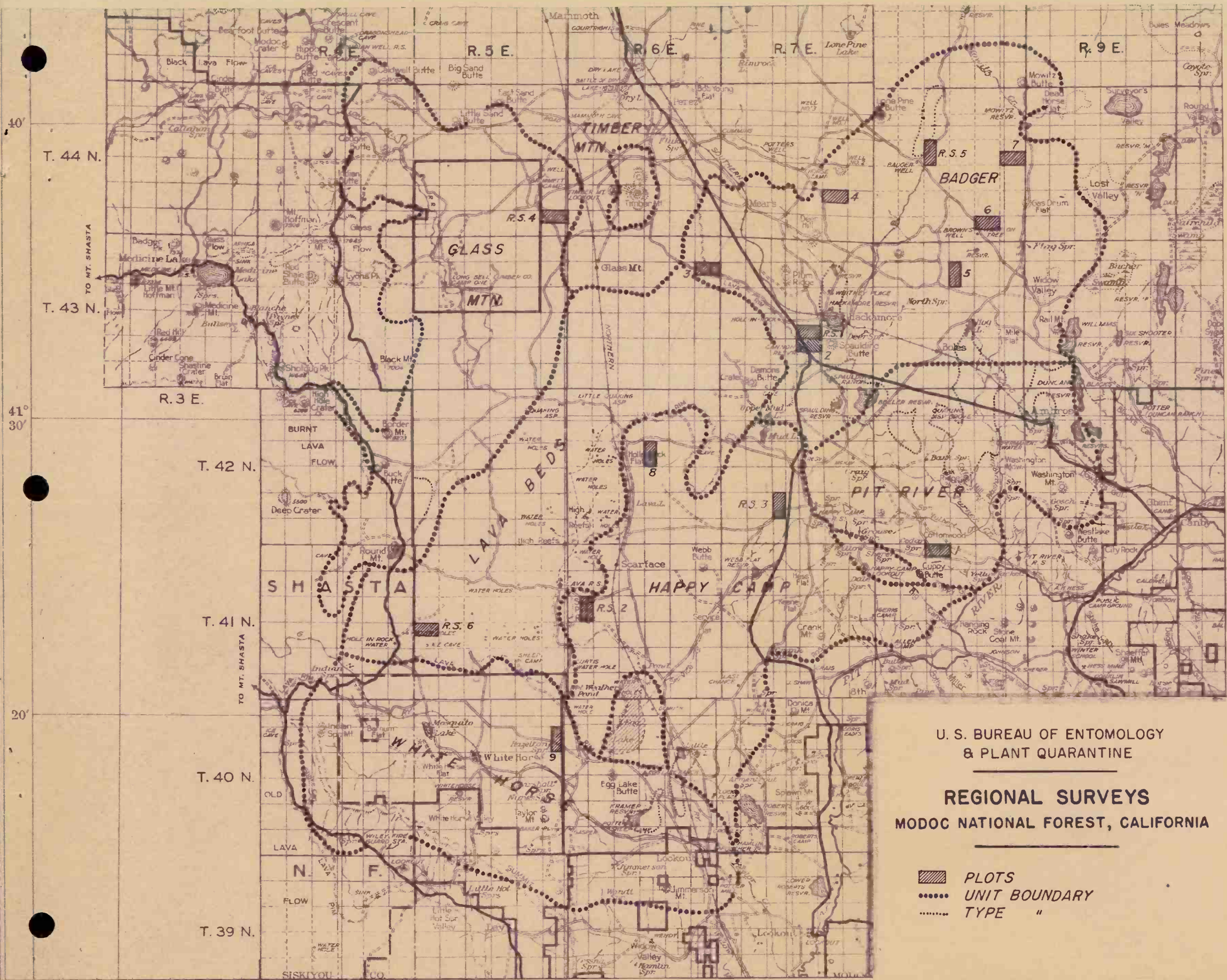
HAPPY CAMP - LAVA BEDS AREA
MODOC NATIONAL FOREST, CALIFORNIA

ANNUAL M.B.M. LOSS
PER SECTION BY UNITS



~~88~~

393



U. S. BUREAU OF ENTOMOLOGY
& PLANT QUARANTINE

REGIONAL SURVEYS

MODOC NATIONAL FOREST, CALIFORNIA

-  PLOTS
-  UNIT BOUNDARY
-  TYPE "

